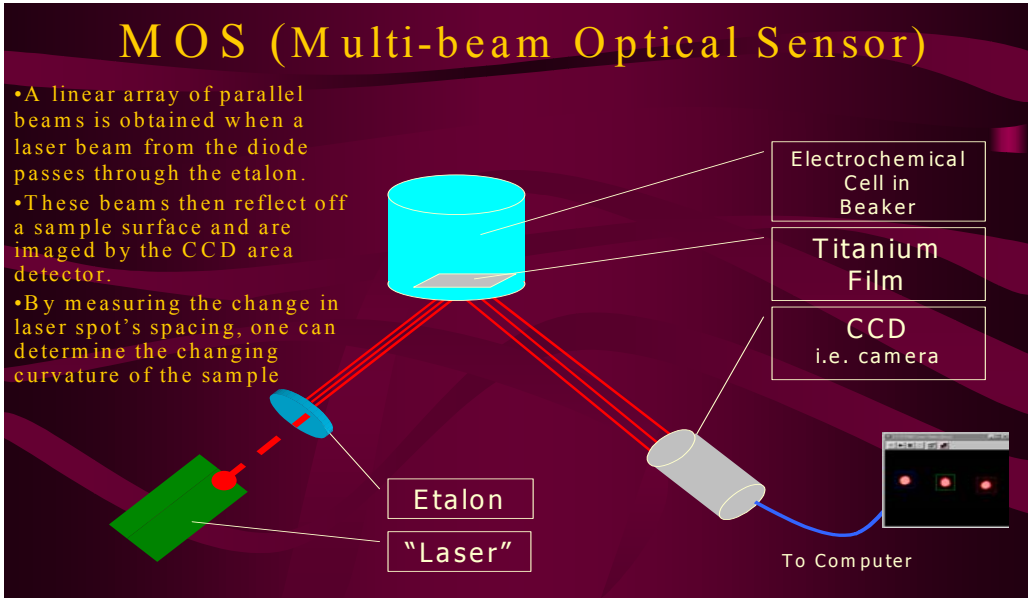
REU Program at Brown Leads to New Application of MRSEC Research



A laser shining onto a metal in an electrochemical cell can be used to measure curvature changes induced by electrochemical reactions

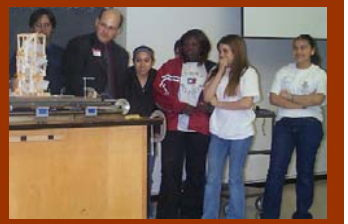
Professor Eric Chason's method of measuring surface curvature has been used extensively to measure stress in thin films of semiconductors as part of our MRSEC research. This undergraduate research applies this method to measurement of stresses in films produced electrochemically which is a research area of Professor Clyde Briant

Empowering your Future:

Sponsored by the National Science Foundation's MRSEC on Micro- and Nano-Mechanics of Electronic and Structural Materials







A Science, Math, and Engineering Conference for Middle School Girls, Parents, and Teachers (Brown University, April 27, 2002).

Student Science Workshop Program

- Liquid Crystals: A Twisted State of Matter
- What's Math Got to do with it?
- Balloon Rocket & Newton's 3rd Law
- Crystals: Computers to Ice Cream
- Polymers: A Soft Phase of Matter
- Engineering with Light
- Structure/Earthquake Competition

Parent Program

- Strategies to Help Girls Succeed in School
- Paying for College Education Taking the Right Steps Now
- Preparing for College: Getting in and Succeeding

Teacher Program

- Integrating Science Modules into your Curriculum

Empowering Your Future

Example Module: *Liquid Crystals-A Twisted State of Matter*

Past

Present

Future

MRSEC Project: Electro-mechanics of indium-tin-oxide (ITO) on polymer substrates for flexible and conformable displays. ITO is standard transparent conductor on polymer that cracks under strain. Currently looking for ways to improve mechanical robustness of ITO on polymer and understand crack formation as a function of strain

MRSEC Education Module

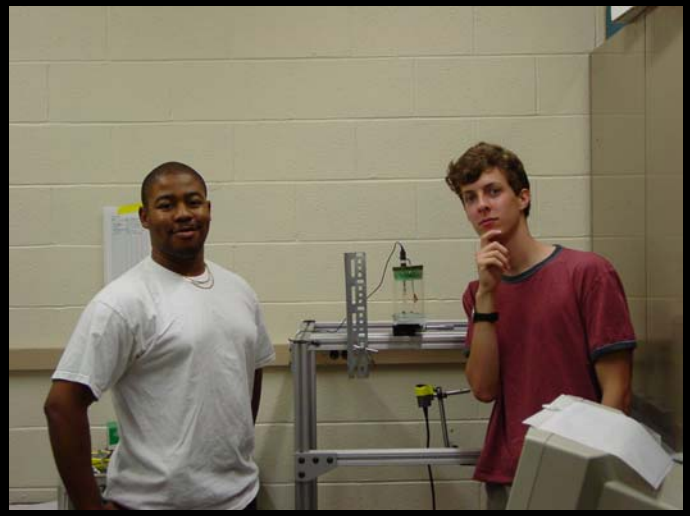
- Basics of liquid crystal displays
- How to generate full color in displays
- Applied voltage and conductors
- Anisotropy – dielectric, optical, and shape
- Hands-on experiment with LCDs and color
- Student challenges

electronic newspaper

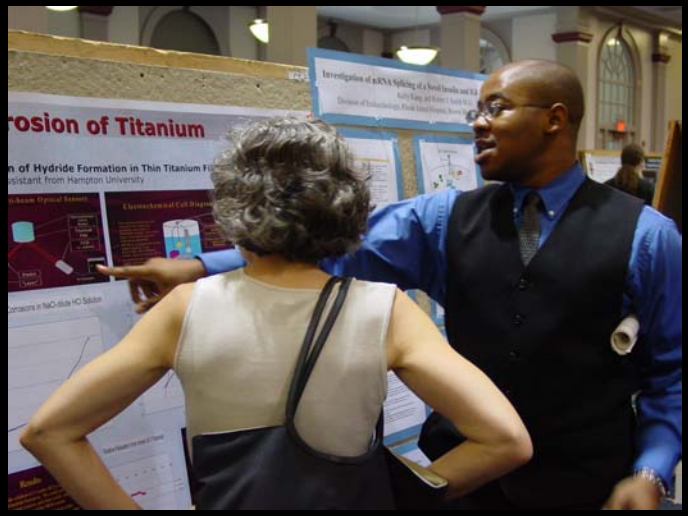
Student Challenge 1– What are new applications for flexible displays?
Student Answers – rollable notebook, curved TV, curved signs, flexible PDA's, switchable wall paper and table clothes, electronic newspaper, curved display wristbands, and displays in clothes

Student Challenge 2– What are the issues with flexible displays?
Student Answers – polymer does not take high temperatures, polymer fails after a lot of flexing, glass is more transparent, and conductor may fail after bending (Right on !!!).

All Research On This Project Was Performed by Undergraduate REUs



Vernorris Kelly, left, of Hampton University and Dan Soltman of Brown work on the system in the lab



Vernorris Kelly explains his work at a poster presentation held at Brown featuring summer undergraduate research.

Three undergraduates, Yutannant Boonyongmaneerat and Daniel Soltman of Brown and Vernorris Kelly of Hampton University, have performed all the research on this program as part of our REU Program.